

Effects of Exercise on Decreasing Prevalence of Cardiovascular Disease

An Honor Thesis (HONR 499)

by

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Abstract

Cardiovascular disease (CVD) is the leading cause of death in the United States due to the lack of education and awareness, along with an unhealthy lifestyle. Before I studied this disease in school, I was unaware of its complexity and magnitude. Eight different risk factors, six controllable and two uncontrollable, can play a role in developing CVD. Either the general population has no knowledge about the risk factors, or they do not know how to control them. This is the main reason I collaborated with the American Heart Association to organize a Heart Walk in East Central Indiana. The Heart Walk raises money and awareness for CVD and stroke. Through this event, we were able to offer educational booths that included blood pressure and body composition. Organizing the logistics leading up to the event was shaky and we were unsure how the event would unfold. However, the participants loved the event and expressed interest in next year's walk. Each participant left the event with general information about CVD along with new knowledge about how to better control their own risk factors.

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Process Analysis

The Significance:

Cardiovascular disease (CVD) is a silent, but deadly killer all over the world, including the United States. Americans choose to live convenient and efficient lifestyles, which affects their health and well-being. Although some individuals exercise daily, the majority of the country does not pay close enough attention to their health until it is too late. For this reason, I devoted my attention and thesis to educating the adult population about how CVD and exercise intertwine. This was accomplished by partnering with the American Heart Association (AHA) to organize a Heart Walk event.

Prior to conducting my creative project, I had to research how CVD transpires. This included studying the risk factors and outcomes. From there, I looked at how each of the eight risk factors affects CVD and separated them into modifiable and non-modifiable categories. Of the six controllable risk factors, I researched the magnitude that each could change by introducing chronic exercise. After completing this research, I compiled the information into vernacular an average American adult would understand. To my surprise, five of the six controllable risk factors were positively affected with chronic exercise. This means, if an individual exercises at moderate to intense intensity for 30 minutes, three times per week, for at least three months, he/she will experience these benefits. If the person keeps up their exercise routine, he/she could eventually get to the point where medications are no longer needed (for hypertension, cholesterol, glucose, etc.).

With these potential benefits, how could I stand to keep this information to myself? Knowing the difference this knowledge could make, I set out to find the best way to educate

the public. Nicole, my advisor, and I eventually decided upon a Heart Walk. This event would aid in the process of spreading awareness of CVD as well as educating the public on how to understand the risk factors associated with developing CVD.

Logistics, Planning, and Fundraising:

The information focused on risk factors, was the foundation for my creative project. Partnering with the AHA to host a Heart Walk provided me with the platform to reach adults of all ages. Being the Logistics Chair Coordinator, I organized all the details for the event. It took place at 8:00 a.m. on April 21st in Yorktown, IN. One task I was assigned, was to gather about 15 volunteers to set up, tear down, and manage the Wellness Village. The Wellness Village opened an hour before the walk began, giving participants time to visit different stations: body composition, blood pressure, kid's corner, CPR, survivor station, and risk factors education. The stations primarily served an educational purposed. I taught the volunteer at the body composition station how to interpret participants' Bio-electrical impedance Analysis (BIA) results in ordinary terms. The research I compiled prior to the event helped me with this task.

Throughout this process, I learned that organizing a large event, like this Heart Walk, takes months of preparation. We started planning for this event over the summer of 2017, trying to get organizations on Ball State University's campus involved with fundraising. Around November of 2017, the Adult Physical Fitness Program (APFP) at Ball State began fundraising. The APFP is a program for adults that offers a gym membership and personalized exercise prescriptions. I served as an intern with the APFP during the spring semester of 2018, which allowed me to lead fundraising and promotional opportunities.

Once fundraising started in the APFP, it did not stop until the day of the Heart Walk. In February, we sold hearts to promote National Heart Month and advertised ways to maintain a healthy heart. In March, we celebrated March Madness by hosting a bracket challenge. Each participant paid \$10 to enter their bracket. In April, we held a raffle with six different gift baskets as well as created and sold T-shirts. Each fundraising opportunity required extensive planning, especially the raffle. For the raffle, I visited numerous different businesses around Muncie to ask for donations. At each location, I had to explain what the Heart Walk was and why it is important to raise money for the AHA. Ball State's goal was to raise \$10,000 and APFP pledged to raise \$1,000 of Ball State's goal.

While the APFP met our goal, Ball State did not come anywhere close to making their goal. Fundraising throughout Ball State was a major challenge I faced. There were all-campus emails, departmental emails, personal emails, organizational emails, club emails, etc. sent out. However, from all this promotion and the countless emails sent, only a handful of people responded. The Dietetics Association, School of Kinesiology, Counseling Psychology, and University College were the only groups of people to respond and show interest in helping fundraise. There was a team captain selected for each team that was responsible for attending a monthly team captain meeting. However, it was a struggle getting a representative from each team at the meetings. So, we ended up just moving the in-person meetings to conference calls. When the walk was completed, Ball State ended up raising \$1,891 and the APFP totaled \$1,070 of that sum.

Challenges:

In addition to fundraising and asking businesses to donate items for the raffle, I was also responsible for “day of” the event donations. Granola bars and coffee were needed for the volunteers, while fruit and water were needed to supply the participants. The challenge was that the Heart Walk has never been held at Morrow’s Meadow before and we had no idea how many participants would show up to walk. Therefore, my problem was that I did not know how much supplies to ask businesses for. In addition to this, many of the businesses had poor communication. I started asking businesses for these “day of” donations in February, understanding that I would have two and a half months to solidify donations. I did not realize that I would have to follow up with businesses two, even three times before I could confirm an answer. This uncertainty was challenging because I could not contact other businesses until I heard back from the ones I initially reached out to.

Not only were businesses a challenge, but the AHA did not fully step in to help until around February. The position that was directly helping us was the Development Director, however, the lady quit in the fall and a new one was not hired until spring of 2018. So, all the work that had been completed in the summer and fall was useless because all the notes were lost in transition. All of this said, we essentially had to start over just a couple of months before the event. Everything was so ambiguous that we thought we would potentially have to cancel the Heart Walk this year. Cassidy was the new hire for the Development Director position and Nicole, my advisor, and I were excited to get right down to business. Once Cassidy acclimated to her new position, things were still unsteady. The communication was not clear between us,

and Nicole and I had a lot of unanswered questions. Even after conference calls with Cassidy, Nicole and I still left the phone call slightly uncertain.

This uncertainty seeped into all aspects of the walk. Even up to a week before the event, I could not find any businesses to donate coffee, granola bars, fruit, or water. I had talked to six different companies and none were willing to step up. I was also responsible for finding a face painter and photographer, but of the five companies I spoke to, none were available, or they never responded to me. During this week, we had our last conference call to iron out last-minute details. Nicole and I only knew about the tasks we were working on and had to trust Cassidy with the rest. However, this trust was difficult seeing that Cassidy was not aware the walk started at 9 a.m. instead of 9:30 a.m. This confusion could have been avoided with better communication when Cassidy took over the Development Director position. The Heart Walk, as a whole, looked like an unfinished puzzle.

Leading up to the event, we planned to have a kid's dash and mascot race following the 1-mile Heart Walk. However, two days before the walk, Charlie Cardinal cancelled on us, so we had to scratch the mascot race. Also, two days before the event, I finally solidified a business to give donuts, instead of coffee, to the volunteers. Donuts were not exactly what we intended to provide the volunteers because this event was to raise awareness for CVD and stroke. However, I had to accept what was provided and just make sure the donuts were hidden from the participants on the day of the event. The volunteers were thankful to have something to eat, being that they arrived at 6:45 a.m. to help set up the Wellness Village and walking course.

Day of the Event:

With all this being said, when the day of the walk finally came around, I was thankful. I never thought putting on an event like this would be so challenging and tedious. People started showing up at 8 a.m. and visited all the stations in the Wellness Village. If a participant visited every station, he/she could put their name into a drawing to win a prize. As I watched participants flow in, my attitude began to change. This was a much better turn out than I ever expected. There were teams walking from IU Ball Memorial hospital and the APFP, as well as numerous individuals. In total, there were roughly 200 people at the walk!

It turns out that one of the face painters I tried to contact decided to help us out when Cassidy reached out to her. I was ecstatic because she occupied the kids, so the parents were able to walk around the Wellness Village to get educated. Also, the DJ was wonderful and excited all the participants up before the walk as well as welcomed them back after the mile was over. Each station in the Wellness Village was completely set up and ready to go when the participants began showing up. All the volunteers were prepared to teach, educate, and interact with the participants. Also, the nice weather allowed families to bring their dogs and young children. This was an important factor because a healthy lifestyle is easier when the whole family is involved.

While roaming around following the walk, I heard people express their love for this event and excitement to return next year. I asked a couple of participants their thoughts and they assured me they would recruit more walkers and even help fundraise next year. One participant expressed how much she loved the park and that she would be back to walk on her own, which I one of the greatest victories in my book. Helping educate the public about CVD as

well as getting them to commit to a regular exercise routine, can aid in decreasing CVD deaths. So, when I heard the participant state she was going to go back and exercise on her own, I lit up. It was exciting to see our hard work pay off, but even more rewarding to know the participants learned something from it.

Lessons Learned:

Overall, I learned that patience, persistence, and perseverance are the three keys to a successful event. Though countless obstacles and issues were thrown my way, I would not have changed the experience for anything. Knowing that a small portion of the public is now educated about CVD, is incredibly rewarding. The participants will hopefully go spread their new knowledge with their family and friends which will help in preventing the disease. Next year, the Heart Walk is going to be bigger and better because the logistics were already ironed out this year. This being said, fundraising and recruiting walkers can take priority over organizational tasks. I am very thankful Nicole and I did not take the easy way out and give up. This event provided exercise, family fun, and a better understanding of the number one killer in the United States.

Foundational Research

Risk Factors:

The prevalence of cardiovascular disease (CVD) in the United States is shocking and creates an unsettling haze amongst the aging population. It is currently the leading cause of death in the United States. This includes a higher prevalence than all forms of cancer combined (2). Atherosclerosis, the stiffening of one's arteries, begins at age seven. However, the buildup of plaque usually does not catch up with the average American until he/she is well into their adulthood (2, 3). Few people, though, are aware of this pertinent information and even fewer know how to use their knowledge they have. Educating the public on interpreting their risk factors is essential in the prevention of CVD.

Risk factors are something doctors look at to determine a person's individual risk of developing CVD. A risk factor is a health topic associated with a number. The eight risk factors are age, smoking, sedentary lifestyle, obesity, hypertension, dyslipidemia, pre-diabetes, and family history. Each factor has a different range of numbers for "normal measures." If an individual is above the normal range for a specific risk factor, it is considered positive. The more positive risk factors, the more likely the individual is to develop CVD (1, 2).

Two of the eight risk factors are non-modifiable, which means the individual cannot control if it will be considered positive or not. These two risk factors are age and family history. If a male is 45 years or older, he is considered to have a positive risk factor for age. If a female is 55 years or older, she is considered to have a positive risk factor for age. Family history, though, is slightly more complex. To be counted as positive, there must have been a myocardial infarction, coronary revascularization, or sudden death before 55 years of age in one's father or

other first degree male relative, or before 65 years of age in one's mother or other first degree female relative. The important thing to remember is that only heart diseases matter when examining the family history (1).

While there are two uncontrollable risk factors, all hope is not lost because six can be controlled. Smoking, sedentary lifestyle, obesity, hypertension, dyslipidemia, and pre-diabetes can all be controlled. Before one can try to control these health concerns, he/she must first understand the risk factor itself. Smoking is measured as positive if the individual is a current smoker, quit within the past six months, or is exposed to environmental tobacco smoke. Sedentary lifestyle is considered positive if an individual does not get at least 30 minutes of moderate to intense exercise (40-60% of maximal effort) three or more days per week, for at least three months. Obesity is positive if the individual's Body Mass Index (BMI) is greater than or equal to 30kg/m^2 , or if a male has a waist circumference greater than 102cm or a female greater than 88cm. When examining hypertension, it is considered positive when an individual's systolic blood pressure is 140mmHg or greater, or diastolic blood pressure is 90mmHg or greater. Additionally, if a person is taking antihypertensive medications, the risk factor is counted as positive. Dyslipidemia looks at different cholesterol measurements like LDL, HDL, and total cholesterol. If LDL is greater than or equal to 130mg/dl, HDL is less than 40mg/dl, total cholesterol is greater than or equal to 200mg/dl, or if the individual is on cholesterol medications, the risk factor is counted as positive. Last, is pre-diabetes which looks at glucose levels. If one's fasting glucose is between 100mg/dl and 126mg/dl, or if their impaired glucose tolerance is between 140mg/dl and 200mg/dl, pre-diabetes is considered a positive risk factor (1).

With this being said, there is a light at the end of the tunnel. HDL is the body's good cholesterol because it shuttles LDL away from the arteries and back into the liver (2). Therefore, if an individual's HDL is greater than or equal to 60mg/dl, a negative risk factor is introduced. This means if a person has two positive risk factors, but their HDL measurement qualifies him/her for a negative risk factor, their net score is one positive risk factor. This could be the difference between moderate or low risk for developing CVD (1).

Although risk factor measurements can be difficult to understand, the public must be educated on these health concerns. The average American does not want to worry about matching specific numbers to their correct factor. Therefore, education should begin with overviewing each risk factor and stressing why it is important to monitor each. A great place to achieve this goal is at events such as walks, runs, informational talks, and/or in the classroom. The most important thing to remember, is to emphasize that controllable risk factors can change based on the actions an individual takes.

Exercise and Risk Factors:

One action an individual can take to decrease their amount of positive risk factors is to exercise. Chronic exercise has been proven to improve health concerns that lead to CVD. Chronic exercise is defined as 30 minutes of moderate to intense exercise, for three or more days per week, for at least three months. If an individual meets these criteria, he/she will reduce their risk of developing CVD due to having one less positive risk factor (not qualifying for sedentary lifestyle) (1). Chronic exercise increases the left ventricle's contractility, the diameter

and capacity of coronary vessels, and the endothelial function and vasodilation. Additionally, it decreases vascular inflammation (2).

Obesity can also be improved with chronic exercise. The more weight an individual loses, the less their BMI will be because BMI takes into account height and weight. The lower their BMI is, the lower his/her chances of having obesity count as a positive risk factor is, too. Waist circumference is also observed for obesity, and the lower this number, the better. Carrying too much weight around the midsection can be detrimental to an individual's organs (2).

Obesity and inactivity are not the only two areas that can be improved with exercise. Hypertension can also improve with chronic exercise. Because the heart contractility is stronger, systolic blood pressure can decrease 5-7mmHg. This small change could change an individual's hypertension diagnosis (4). Chronic exercise and monitoring nutritional needs can also play a role in improving dyslipidemia. HDL can increase by 2-8% which can, in turn, decrease LDL 8-30%. Also, due to the muscle and adipose tissue lipoprotein increase, the triglyceride count can decrease 12-29% (5). Lastly, pre-diabetes can be controlled easier with chronic exercise because cells become more insulin sensitive and more GLUT 4 receptors appear (2).

Overall, chronic exercise positively affects five of the six controllable risk factors, with smoking being the exception. Therefore, the safest and simplest solution to decreasing the prevalence of CVD is exercise. With CVD being the number one killer in the United States, the public needs to be educated on this simple, preventative method.

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